Innovative Tools and Methods for Assessing Children's Potential Chemical Exposures

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Children's exposures to environmental contaminants are different than adults, due in part to differences in physiologic function, surface-to-volume ratio, and the way in which children interact with their environment (e.g., sitting on the floor, eating off the floor, hand-to-mouth activity). Therefore, the tools and methods used to assess exposure for adults cannot be directly applied to children. Research on children's exposure to environmental contaminants is currently being performed within EPA, academia, industry, and other research organizations. However, the protocols and methods that have previously been developed and implemented by individual researchers for specific studies do not always collect all of the data that are required for reliable exposure assessments. As a result of these shortfalls, the collected data have not always been appropriate for assessing human exposures and risks. Likewise, protocols for developing exposure factor data to be used for modeling assessments have not been available. To evaluate whether a subpopulation can be considered to have differential risks, both the tools and methods needed for measuring differential risks must be developed and tested.

Numerous tools and methods have been developed by the Office of Research and Development (ORD) to characterize children's pesticide exposures. These tools and methods include (1) a protocol for evaluating children's aggregate exposures to chemicals; (2) the use of commercially available diapers for collecting urine samples from infants; (3) a non-invasive saliva biomonitoring method; (4) improved methods for collecting and analyzing dust samples; (5) a glove protocol method to assess pesticide exposures from pets; (6) improved methods for collecting time/activity information, including a visual child activity diary and a novel global positioning system technology to characterize child activity patterns; (7) methods for using cotton garments to estimate dermal exposure; (8) development of a less burdensome "lunchbox" sampler for air sampling; (9) multi-residue analysis methods for pyrethroid pesticides in various media; and (10) methods for sampling surfaces using wetted wipes.

Using state-of-the-art tools and methods to understand exposure reduces our reliance on default assumptions in the risk assessment process and improves our understanding of the most important exposure factors, ultimately leading to improved public health.

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